THE JOHNSON COMPANY, INC.
Environmental Sciences and Engineering

SEP 08 1992

September 4, 1992

Ms. Cindy Woods
Hazardous Materials Management Division
Department of Environmental Conservation
103 South Main Street
Waterbury, Vermont 05676

Re: Summary Report for Sports West, West Rutland
JCO # 1-0739-2 (047)

Dear Ms. Woods:

Attached is a copy of the Phase II site assessment report for the Sports West property in West Rutland. This report summarizes the work completed to date, including the new wells and sampling data, and makes some recommendations for the future clean-up work at the site.

Please feel free to call me or Tammy Fortier if you have questions or comments. Thank you.

Sincerely,

THE JOHNSON COMPANY, INC.

By: Carol LaCasse for:
Alan R. Liptak
Senior Scientist

cc with report: Mr. Stanley Gawet
Ms. Sharon Campbell, Sandri, Inc.

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1.0 INTRODUCTION

The Johnson Company, Inc. of Montpelier, Vermont was retained by Mr. Stanley Gawet to perform a Phase II investigation of subsurface petroleum contamination at a site in West Rutland, Vermont, referred to as Sports West. Sports West is located about 2 miles west of the downtown area of the City of Rutland on Vermont Route 4A, and approximately 3/4 miles south of the intersection of Route 4A and Route 3, adjacent to the Rutland Town-West Rutland Town line (Figure 1). The property currently houses two commercial establishments: a Sunoco gasoline station and a motorcycle sales and repair shop. This investigative work is being performed under the direction of the Vermont Department of Environmental Conservation (DEC).

The Johnson Company initially performed a Phase I site investigation at Sports West in the spring of 1992. The results of the phase I investigation are contained in a summary report dated May, 1992, which was submitted to the DEC. The Phase I investigation consisted of installation of three groundwater monitoring wells, sampling and laboratory analysis of the groundwater and surface water in the vicinity, and review and reporting of the results of this testing. The data collected during the Phase I investigation indicated that benzene and toluene were present in the groundwater beneath a portion of the property at concentrations above the Vermont enforcement standard. Also, MTBE, a common gasoline additive for which no enforcement standard has been set, was detected in MW-2 and MW-3 on April 3, 1992. No contamination was detected in the upgradient groundwater monitoring well MW-1, the on-site bedrock drinking water well, or in the surface waters to the east of the site during the Phase I investigation.

During the completion of the Phase I investigation, a sudden release of petroleum was reported from one of the underground storage tanks on the site, after the Phase I groundwater sampling had been performed. The Phase I report recognized the possibility of a leaking tank beneath the site as the cause of the positive detection of contaminants in the groundwater beneath the site, and recommended that three additional wells be installed on the site, followed by a survey and water quality sampling, to more accurately assess the direction of groundwater flow and the contaminant distribution beneath the site. This additional work was requested by and approved by Ms. Cindy Woods of the DEC Sites Section during a telephone conversation with the Johnson Company on May 12, 1992 (Johnson Company, 1992a).

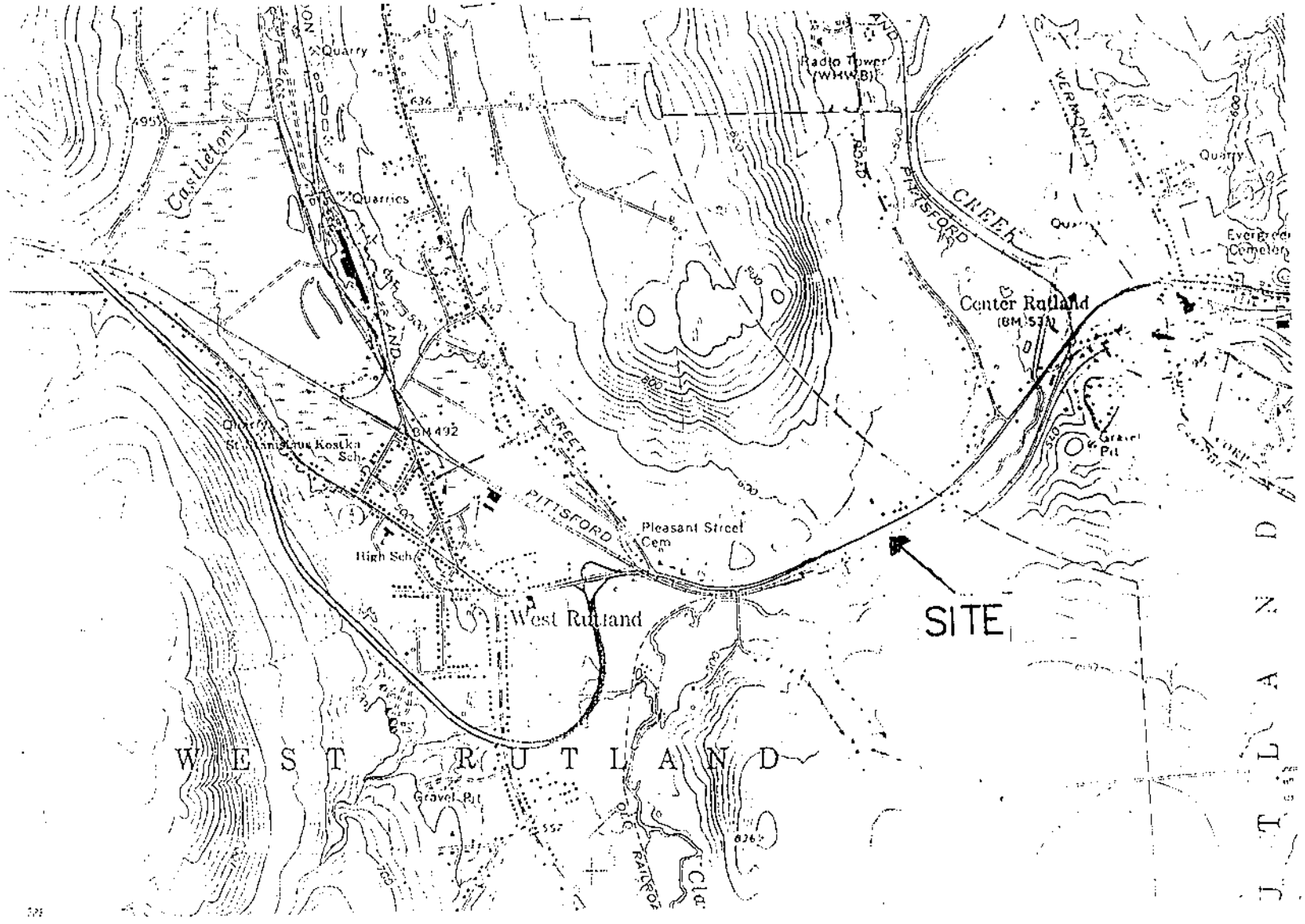


	FIGURE 1 – SITE LOCATION MAP SPORTSWEST WEST RUTLAND, VERMONT	THE JOHNSON COMPANY, INC. Environmental Sciences and Engineering MONTPELIER, VERMONT

1-0739-2\FIG1.dwg

2.0 SUMMARY OF WORK PERFORMED

The scope of work performed by the Johnson Company and its subcontractors during the Phase I investigation consisted of the following:

- Installation of three additional soil borings and groundwater monitoring wells.
- Screening of soil samples with a photoionization detector during the soil boring installation.
- Water level measurements from the completed groundwater monitoring well network.
- Sampling and analysis of groundwater for petroleum-related compounds from six groundwater monitoring wells and the on-site drinking water well.
- Sampling and analysis of the water samples from wetland area to the southeast of the filling station, and
- Establishment of the relative elevations of all six monitoring wells.

These tasks and the results obtained are further described below.

3.0 SOIL BORINGS AND GROUNDWATER MONITORING WELL INSTALLATION

On May 26-27, 1992, The Johnson Company oversaw the installation of three groundwater monitoring wells on the Sports West property. The wells were installed by All-Terrain Drilling of Greenland, New Hampshire, under the supervision of Johnson Company personnel. All monitoring wells were installed in accordance with Standard Operating Procedure JCO-003. All equipment was steam-cleaned before the start of the first borehole, between each borehole and after the last borehole was completed.

A truck-mounted B-47 mobile drill unit was used to drill the boreholes and install the monitoring wells. A 3-inch solid stem auger was used to begin each of the boreholes. During the drilling of each borehole, large buried rocks were encountered at depths of less than 5 feet. When the obstruction was encountered, the solid stem auger was removed from the drill stem and a diamond bit casing was installed. This technique used a hollow six-inch iron casing, with a diamond bit affixed to the end of the casing, to spin through the rocks. This process requires water to lubricate and cool the diamond bit and to raise the cuttings from the bit. The process water was obtained from the water supply well on site. Each of the wells were completed using the spun casing technique.

Figure 2 shows the as-built locations of the new monitoring wells (MW-4, MW-5, and MW-6) in relation to the three existing monitoring wells on the site. The detailed boring logs for the newly-installed wells are included in Attachment 1. The sediments encountered during drilling were generally sandy fill materials underlain by medium to coarse sands. Numerous rocks were encountered and bored through

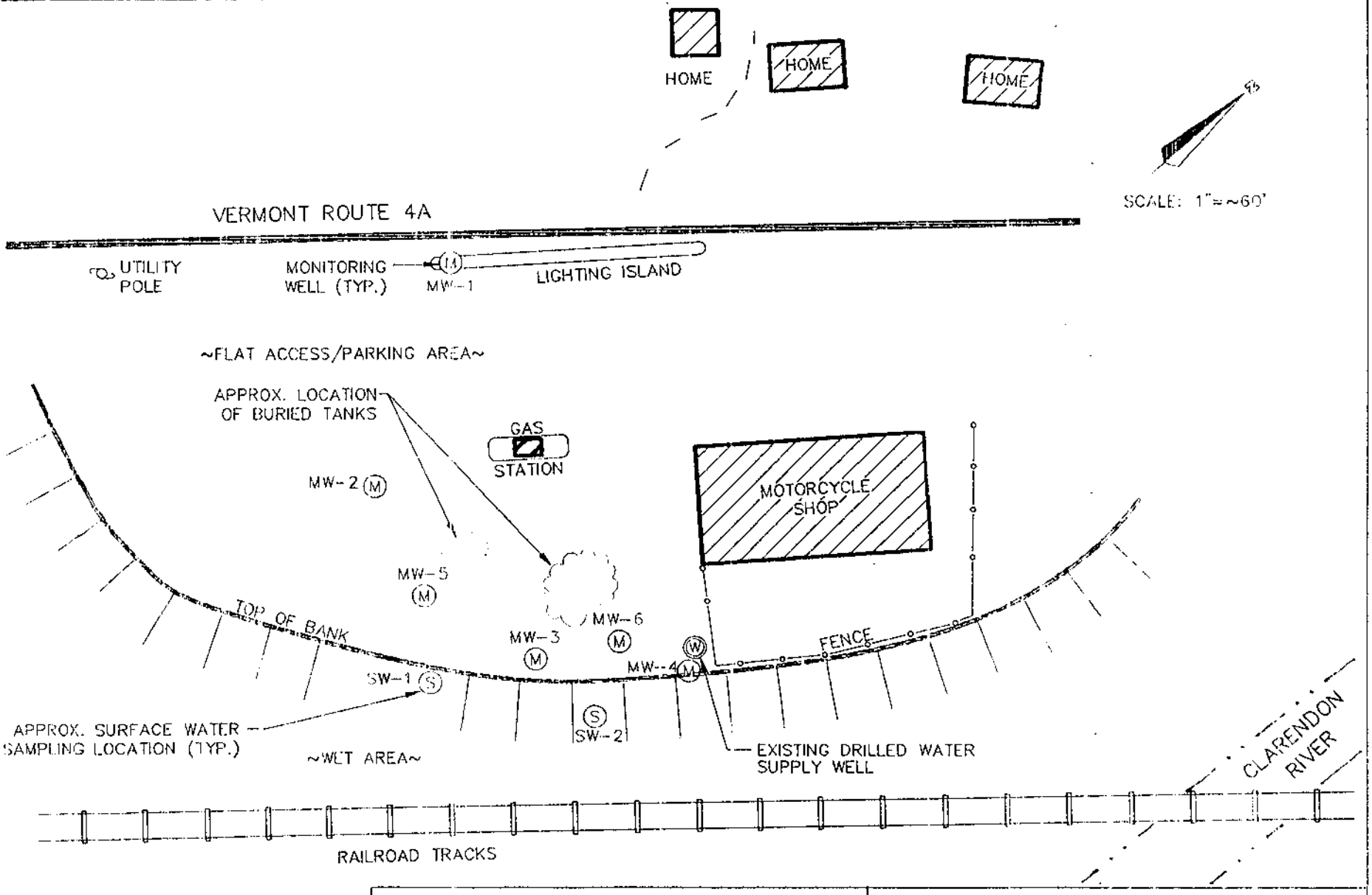


FIGURE 2 – PROPERTY SITE SKETCH
SPORTSWEST
WEST RUTLAND, VERMONT

THE JOHNSON COMPANY, INC.
Environmental Sciences and Engineering
MONTPELIER, VERMONT

1-0739-2\FIG2.dwg

during the installation of the monitoring wells. Groundwater was generally encountered between 10-13 feet below the ground surface in these borings, however the exact depth of initial groundwater penetration was somewhat obscured by the process water used during the drilling.

Split-spoon soil samples were taken at intervals of 5 feet or less during drilling. Each sample was field analyzed using a photoionization detector to detect the presence of any volatile organic compounds in the samples. The results of the photoionization screening are included on the well logs in Attachment 1. All groundwater monitoring wells were constructed of 2-inch diameter PVC well pipe, with 10-foot screens. All drill cuttings and well purge water were disposed of on-site during the assessment. All monitoring wells were completed below the ground surface with a curb box and a compression fitting.

Ambient gasoline vapors were noted during the installation of MW-4, during a period of predominantly easterly winds. In response, field personnel conducted a walkover of the area between the MW-4 well installation and the wetland area on May 26, 1992. It was noted that at the time, a rust-colored film had developed over portions of the wetland area near the shoreline, and also that much of the vegetation in the immediate vicinity was dead or dying. Photoionization detector readings of 0-78 ppm were recorded near the ground surface during this walkover.

3.1 MONITORING WELL LOCATIONS

Three additional groundwater monitoring wells were installed at the Sports West site in order to accomplish the following objectives: prediction of groundwater flow direction with improved accuracy; establishment of additional groundwater quality monitoring points; assessment of the degree and extent of contamination beneath the site; and prediction of contaminant migration direction. The justification for the location of each of the wells are as follows.

3.1.1 MW-4

This well was installed in the immediate vicinity of the existing water supply well on-site. It allows for the sampling of the surficial aquifer northeast of the buried tank farm, and it allows measurement of hydraulic head at that location.

3.1.2 MW-5

This well is located southeast of the buried fuel tanks, between existing MW-2 and MW-3. This well allows for water level measurements and chemical quality testing in the area southeast of the buried tanks.

3.1.3 MW-6

This well is located northeast of the buried fuel tanks, between existing MW-3 and the existing drilled water supply well. This well was installed after the detection of ambient vapors near MW-4, to assess in more detail the groundwater levels and quality east of the buried tanks.

The monitoring network at Sports West now consists of six groundwater monitoring wells. Five of these wells are located east, southeast or northeast of the buried tanks, and the remaining well is west of the tanks. This configuration allows for accurate prediction of the groundwater flow direction beneath the site, and provides a closely-spaced monitoring network in the general downgradient direction, to assess the degree of contamination beneath the site.

3.2 GROUNDWATER MONITORING WELL ELEVATIONS AND WATER LEVELS

Groundwater level measurements were taken during this investigation, from the six monitoring wells at the site. An informal survey was conducted on June 3, 1992 to establish the relative elevations of the newly-installed monitoring wells in relation to the existing monitoring wells. The relative top of casing elevations and relative groundwater elevations are presented in Table 1.

Groundwater table gradients across the site were estimated using MW-1 as a control point. Gradients were calculated by dividing the net difference in relative groundwater elevation between two monitoring wells by the horizontal separation of those wells.

Based on the groundwater table gradient calculations, groundwater contour lines were estimated and the groundwater flow direction was predicted. This information is presented in Figure 3. The surficial groundwater flow beneath the site is predicted to be in an easterly direction, toward the wetland area and railroad tracks. The Phase I assessment report predicted groundwater flow to be in a southeasterly direction, based on groundwater level information collected on April 3, 1992, from MW-1, MW-2, and MW-3. The additional monitoring wells installed during the Phase II assessment have improved the prediction of groundwater flow direction in this area of the property. Alternatively, a seasonal shift in the groundwater flow direction is also a possibility.

The eastward tilt of the June 3, 1992 water table is indicated by the direction of the maximum hydraulic gradient which is in a line from MW-1 to MW-6. Gradient calculations are included in Attachment 2.

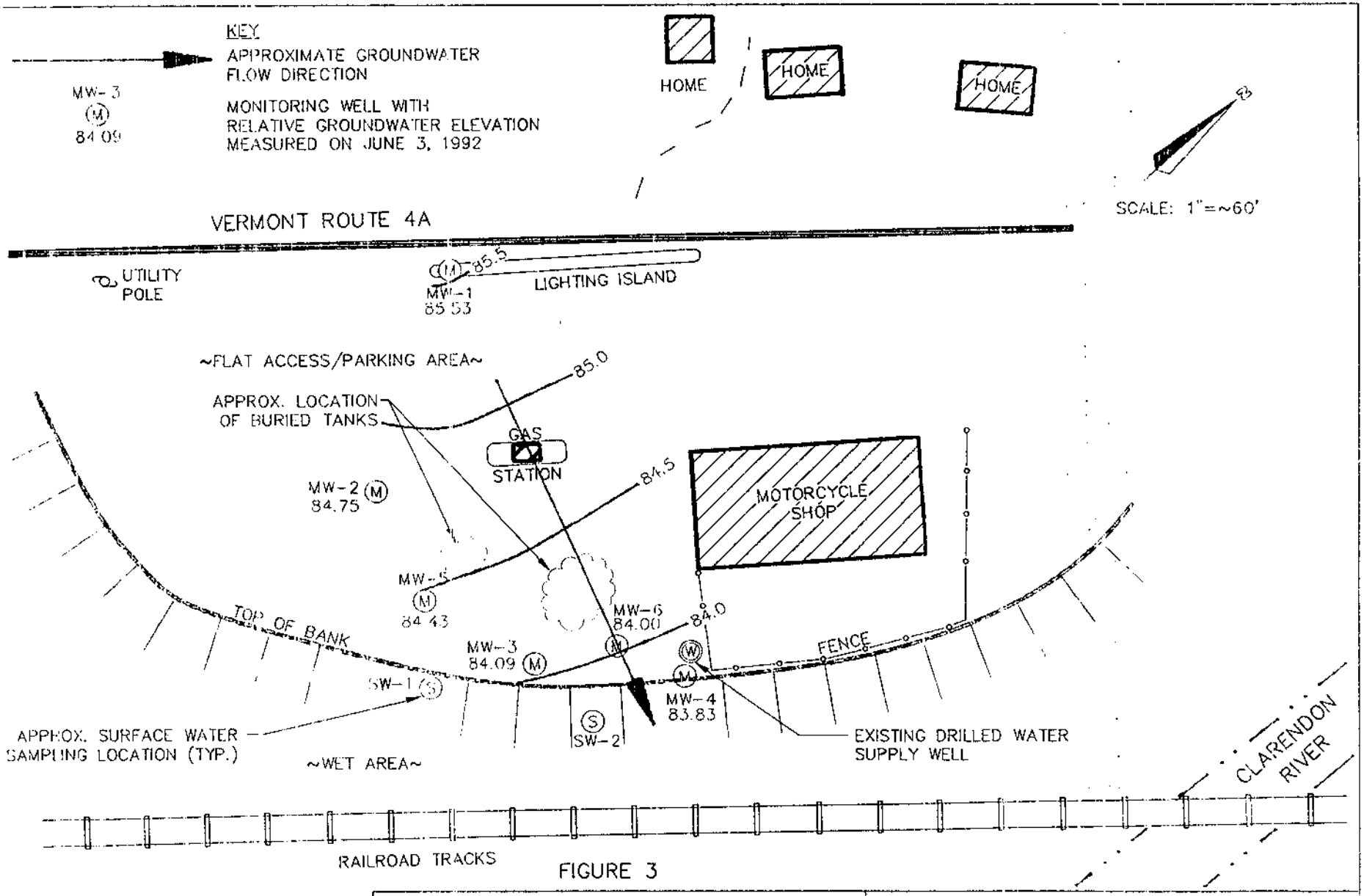


FIGURE 3

WATER TABLE CONTOUR MAP 6/3/92 SPORTSWEST WEST RUTLAND, VERMONT	THE JOHNSON COMPANY, INC. Environmental Sciences and Engineering MONTPELIER, VERMONT

1-0739-2\FIG1.dwg

Table 1
Relative TOC and Groundwater Elevations

	Relative TOC Elevation	Depth to Groundwater from Top of Casing	Relative Groundwater Elevation 6/3/92
MW-1	96.10	10.57	85.53
MW-2	94.43	9.68	84.75
MW-3	95.11	11.02	84.09
MW-4	96.21	12.38	83.83
MW-5	94.86	10.43	84.43
MW-6	96.34	12.34	84.00

Comparison of water level information from the April to June readings indicates that water levels have fallen approximately 1-2 feet in MW-1, MW-2, and MW-3 during this period, and that the measured gradient from west to east across the site has increased slightly. An estimated hydraulic gradient of 0.7% was present on April 3, during the period of higher water levels. The estimated gradient increased to 0.9% during the June measurements. One possible explanation for this slight increase in hydraulic gradient is that while the groundwater source for the site has probably remained at a relatively stable elevation (across Route 4, uphill of the site), the discharge elevation for the site (the wetland east of the site) may have declined during this period. Since the sediments beneath the Sports West property appear to be relatively permeable, this change in hydraulic head from recharge to discharge point would be reflected in the on-site monitoring wells relatively rapidly. Another possibility is that the additional groundwater monitoring wells have provided a more complete basis for assessment of the direction of maximum hydraulic gradient beneath the site.

3.3 GROUNDWATER SAMPLES AND ANALYTICAL RESULTS

The Johnson Company collected water samples from five of the six groundwater monitoring wells at the Sports West property on June 3, 1992. The sampling was performed in accord with SOP-JCO-008, Standard Operating Procedure for Groundwater Sampling of Monitoring Wells: Water Quality. One trip blank and one replicate sample were also analyzed for quality control and assurance purposes. These sample were collected using dedicated disposable bailers.

We did not collect a groundwater sample from MW-3 on June 3, 1992. After purging about 2.5 gallons from MW-3 and allowing it to equilibrate for 2 hours, approximately 1/4 inch of free floating petroleum was found on the groundwater surface on that date. The detection of elevated concentrations

of dissolved gasoline constituents in the sample would have been a foregone conclusion, given the presence of free floating petroleum in the well.

Water quality samples were placed in 40 ml vials and were delivered under chain-of-custody arrangements to SciTest Laboratories in Randolph, Vermont on the day of collection. The samples were analyzed on June 5-9, 1992 for aromatic compounds using EPA Method 8020. The sampling results were received by The Johnson Company on June 26, 1992.

The Johnson Company also obtained a water sample on June 3, 1992 from the on-site drinking water supply at Sports West, and also a surface water sample from the wetland area east of the buried tanks. A well description for the on-site drinking water supply was included in the Phase I report for the site.

The analytical results are summarized in Table 2. Copies of the laboratory report and the Chain-of-Custody form are included in Attachment 3.

The water quality data reported by SciTest Laboratories indicates that the background well, MW-1, contained no detectible petroleum contamination on June 3. MW-2 and MW-5 were showing only limited traces of petroleum contamination on June 3. MW-4 and 6 contained significant amounts of gasoline compounds on June 3. Benzene concentrations in excess of the enforcement standard were detected in MW-2, MW-4, MW-5, and MW-6. Toluene was detected at levels above the enforcement standard in MW-6 and at concentrations below the enforcement standard in MW-2 and MW-3. Xylene concentrations in excess of the enforcement standard were detected in MW-4 and MW-6. Ethylbenzene was detected above the enforcement standard in MW-6 and below the enforcement standard in MW-4. Methyl Tertiary Butyl Ether (MTBE) a common gasoline additive, was detected in MW-2, MW-4, MW-5, and MW-6.

Based on the analytical data from the June 3, 1992 sampling, an estimated contaminant distribution sketch was generated (Figure 4). A zone of floating gasoline is predicted to have existed on June 3 in the immediate vicinity of MW-3. It is postulated that this zone of floating gasoline was surrounded by a zone of dissolved-phase contamination as indicated in Figure 4. The highest reported dissolved concentrations of contaminants are detected in MW-6, with the total concentrations declining exponentially in MW-4, MW-5, and MW-2. Based on the distribution estimation, contaminant levels decrease rapidly north, south and southwest of MW-3.

NOTE: Values given represent the sum of Benzene, Toluene, Ethylbenzene, Total Xylenes, and MTBE in parts per billion, as reported by SciTest Laboratories on June 26, 1992, for samples collected on June 3, 1992.

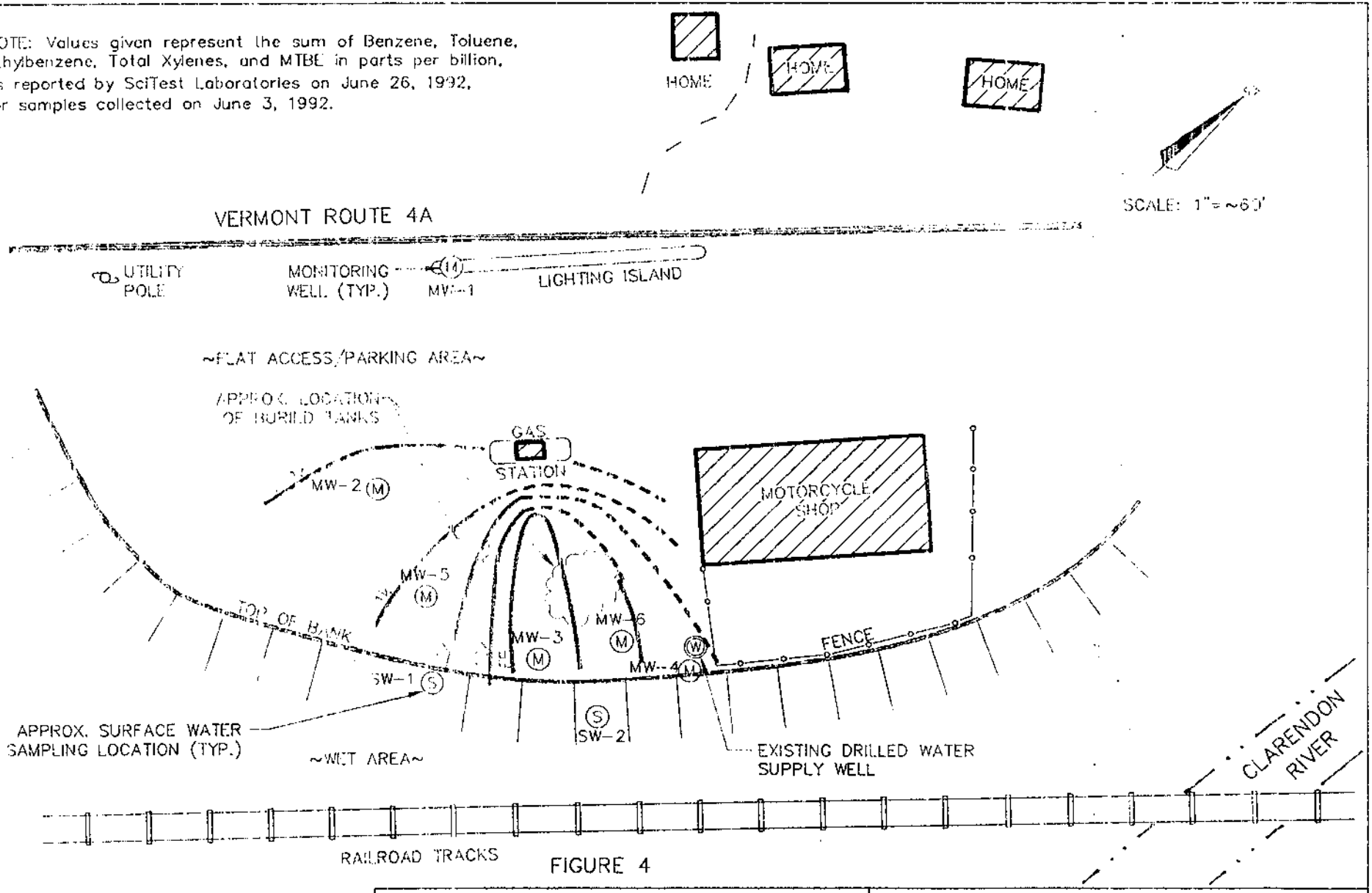


FIGURE 4

ESTIMATED CONTAMINANT DISTRIB. 6/3/92 SPORTSWEST WEST RUTLAND, VERMONT	THE JOHNSON COMPANY, INC. Environmental Sciences and Engineering MONTPELIER, VERMONT

1-0735-2\FIG4.dwg

Table 2
Summary of Water Quality Sampling Analytical Results
Samples Collected June 3, 1992
Units are ug/L Except as Noted

	Benzene	Toluene	Ethylbenzene	Total Xylenes	Methyl Tertiary Butyl Ether
MW-1	<1	<1	<1	<1	<1
MW-2	6	2	<1	<1	6
MW-4	800	2260	322	1390	430
MW-4 Duplicate	694	2191	305	1325	266
MW-5	10	<1	<1	<1	189
MW-6	5180	7700	730	4530	6320
Surface Water-2	4	8	<1	3	7
Water Supply Well	<1	<1	<1	<1	<1
Trip Blank	<1	<1	<1	<1	<1
Enforcement Standard *	5.0	2420	680	400.0	NA

NA = Not applicable, no enforcement standard set
* Source: State of Vermont Ground Water Protection Rule and Strategy, Effective Date 9/29/88.

The results of surface water sampling in the vicinity of SW-2 indicate that the surface water was slightly contaminated with traces of petroleum compounds on June 3. This sample was taken near MW-3 and MW-6 and is consistent with the groundwater flow observations made earlier in this report, and with the field observations made during the drilling. The reported results indicate that benzene, toluene, xylenes and MTBE were detected in low concentrations at the SW-2 location. This area probably represents the discharge zone for the groundwater which flows beneath the gasoline station.

The results for the water supply well analyses indicate that this well remained clean as of June 3, with no detectible petroleum compounds reported. The quality control information (duplicate samples, trip blank) indicates that the laboratory results were generated with acceptable precision, and that the samples were not contaminated during collection or transport.

4.0 CONCLUSIONS AND RECOMMENDATIONS

The Phase II investigation has confirmed the presence of petroleum-related contamination beneath the Sports West property. The contaminant plume appears to be fairly localized and is likely moving in an easterly direction, toward a discharge point in the wetland. Water samples taken from the wetland indicate that some petroleum contamination is reaching the wetland. The presence of gasoline vapors in the vicinity of SW-2 also support the eastward groundwater flow direction toward the wetland.

The presence of petroleum compounds in surficial groundwater beneath the site has been detected in MW-2, MW-3, MW-4, MW-5 and MW-6. Free-floating petroleum contamination was noted in MW-3 on June 3, 1992. Analysis of the reported contaminant concentrations for the groundwater monitoring wells without free-floating petroleum indicates that the dissolved phase concentrations of contaminants are highest in the vicinity of MW-6, and that concentrations fall off rapidly as distance from the center of the plume increases. This observation supports the notion of a fairly narrow plume of contaminants between the buried tanks and the wetland, primarily in the area of MW-3, 4 and 6.

The clean analytical results from the on-site drilled water supply well, coupled with the proximity of this well to the zone of contaminant migration, indicate that the bedrock aquifer in this immediate area may not be a sensitive receptor of the contamination in the surficial aquifer. While future contamination of this well cannot be ruled out, it appears that the recharge to the bedrock aquifer does not originate in the surficial aquifer in this area, and also that the well is adequately sealed into bedrock to inhibit leakage around the casing.

The predicted direction of surficial groundwater flow toward the east is further supported by the continued clean test results for MW-1. The lack of detectible contamination in MW-1 indicates that the surficial aquifer does not flow toward the west at this location. This finding, coupled with the relative insensitivity of the bedrock aquifer beneath the site, indicates that the primary discharge for the contaminants beneath the site is toward the east, not toward the west, and away from the drinking water wells that exist along Route 4 near the site. It does not seem likely that the contaminants at the Sports West site would be able to impact water supply wells to the west, either in surficial materials or in bedrock materials.

Thus, the primary receptor for the contamination appears to be the wetland area east of the site. The presence of free-floating petroleum on the groundwater table confirms that a sizeable release has occurred at the site in the recent past. It is advisable that some actions be taken to minimize the effect of

this release on the surface water in the vicinity. Specifically, we recommend that a combination of soil removal and product removal be performed on the site, to remove the possible sources of ongoing contaminant release to the environment. Our experience has been that once petroleum is released to a site in quantity sufficient to allow it to form a separate phase, the unsaturated soils above the water table will retain a significant portion of the product. This retained petroleum will be released to the groundwater during periods of high groundwater elevation.

Thus, we recommend as a first step, that the existing underground storage tank suspected of causing the release be removed from the ground, along with the surrounding soils, in accord with Vermont DEC policies. This removal will help eliminate the source of the contaminants, and will allow for more effective treatment of groundwater beneath the site. One principle concern with the removal of the underground tank is the potential for damage to adjacent underground storage tanks at the site, due to the loss of structural support and/or physical damage during removal. We have been informed by the owner that the underground tanks are closely spaced, and that removal could compromise the integrity of the adjacent tanks.

Second, we recommend that a free-phase recovery system be installed on the site in the vicinity of MW-3, to be operated as needed to remove floating gasoline from beneath the site.

Removal of dissolved-phase contamination from the groundwater beneath the site should <u>not</u> be attempted until both of the preceding steps have been successfully accomplished, and until there is no more free floating petroleum beneath the site. The small zone of impacted groundwater beneath the site, coupled with the relatively high assumed permeability of the sediments beneath the site, poses special problems for the operation of a dissolved-phase contaminant removal system. Such a system should only be considered for the site in light of the existing receptors and the observation of additional water quality data from the wells over the term of the soil and product removal. It may not be justifiable to perform dissolved-phase contaminant removal at this site, if the sources of contamination (contaminated soil and floating gasoline) can be successfully removed, if the concentration of contaminants in the monitoring wells declines following this removal, and if the on-site drinking water supply remains free of contamination.

REFERENCES CITED

The Johnson Company, Inc., May, 1992, Environmental Site Assessment for Sports West, 10 pages and attachments.

The Johnson Company, 1992a, telephone conversation with Ms. Cindy Woods, DEC Sites management Section, re: work scope for Phase II site investigation at Sports West, May 12, 1992, 7:50 A.M.

Reviewed by: jrb
J:\PROJECTS\1-0739-2\REPORT.DOC July 27, 1992 16.23 ARL/TMF

Appendix 1

Boring Logs and Monitoring Well Completion Diagrams

The Johnson Company, Inc.
Environmental Sciences and Engineering
5 State Street
Montpelier, Vermont 05602

DRILLING LOG
WELL # MW-4

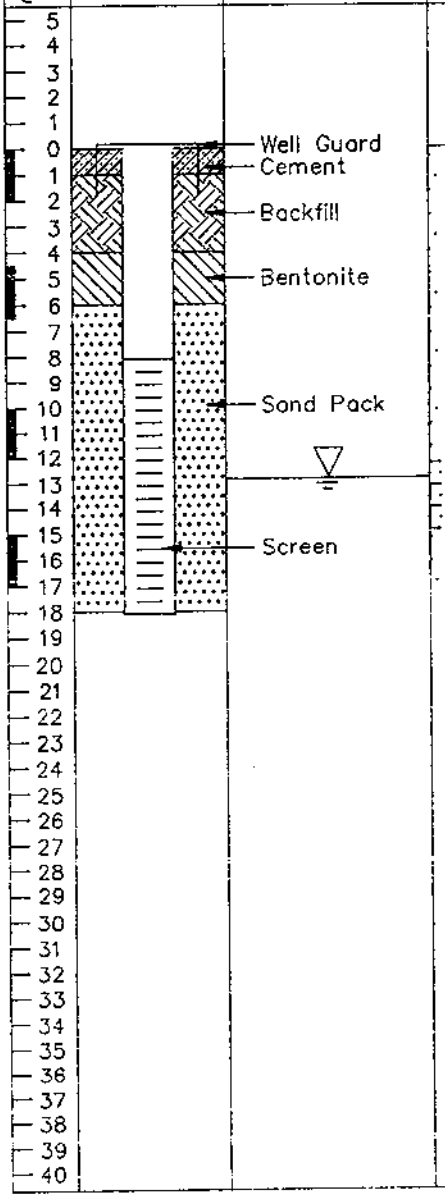
Project: Stanley Gawet
Location: West Rutland
Job # 1-0739-2
Logged By: TMJ/ARL
Date Drilled: 5/20/92
Driller: All Terrain Drilling
Drill Method: Air Rotary

Casing Type: PVC
Casing Diameter: 2.0 in.
Casing Length: 7.2 ft.
Screen Type: Factory
Screen Diameter: 2.0 in.
Screen Length: 10.0 ft.
Slot Size: 010

Total Pipe: 17.6 ft.
Stick Up: -0.5 ft.
Total Hole Depth: 18.1 ft.
Well Guard Length: 2.0 ft.
Initial Water Level: 12.8 ft.
Surface Elevation: -
T.O.C. Elevation: -

■ = Sampled Interval

Sheet 1 of 1



The Johnson Company, Inc.
Environmental Sciences and Engineering
5 State Street
Montpelier, Vermont 05602

DRILLING LOG
WELL # MW-5

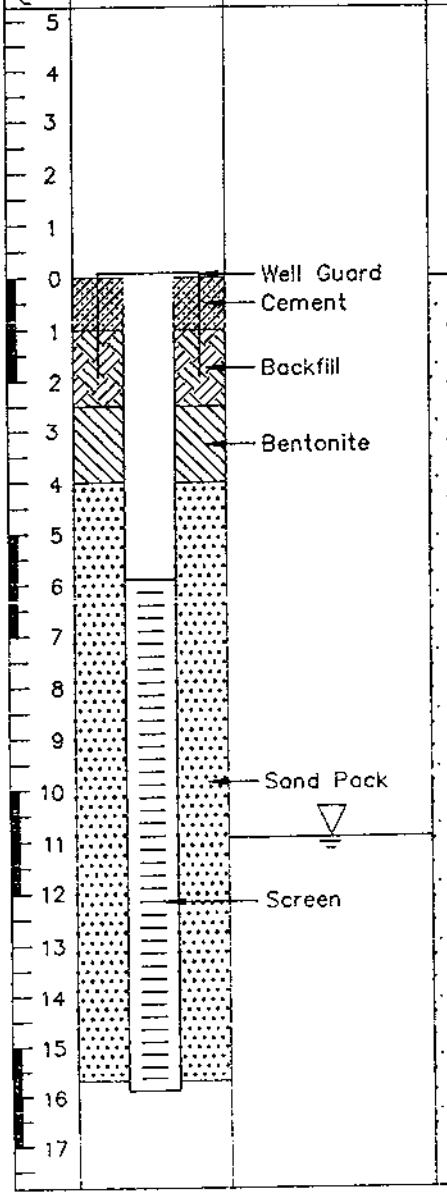
Project: Stanley Gawet
Location: West Rutland, Vermont
Job # 1-0739-2
Logged By: ARL
Date Drilled: 5/26/92
Driller: All Terrain Drilling
Drill Method: Air Rotary

Casing Type: PVC
Casing Diameter: 2.0 in.
Casing Length: 5.4 ft.
Screen Type: Factory
Screen Diameter: 2.0 in.
Screen Length: 10.0 ft.
Slot Size: 010

Total Pipe: 15.4 ft.
Stick Up: -0.5 ft.
Total Hole Depth: 15.9 ft.
Well Guard Length: 2.0 ft.
Initial Water Level: 10.9 ft.
Surface Elevation: -
T.O.C. Elevation: -

▌ = Sampled Interval

Sheet 1 of 1



The Johnson Company, Inc.
Environmental Sciences and Engineering
5 State Street
Montpelier, Vermont 05602

DRILLING LOG
WELL # MW-6

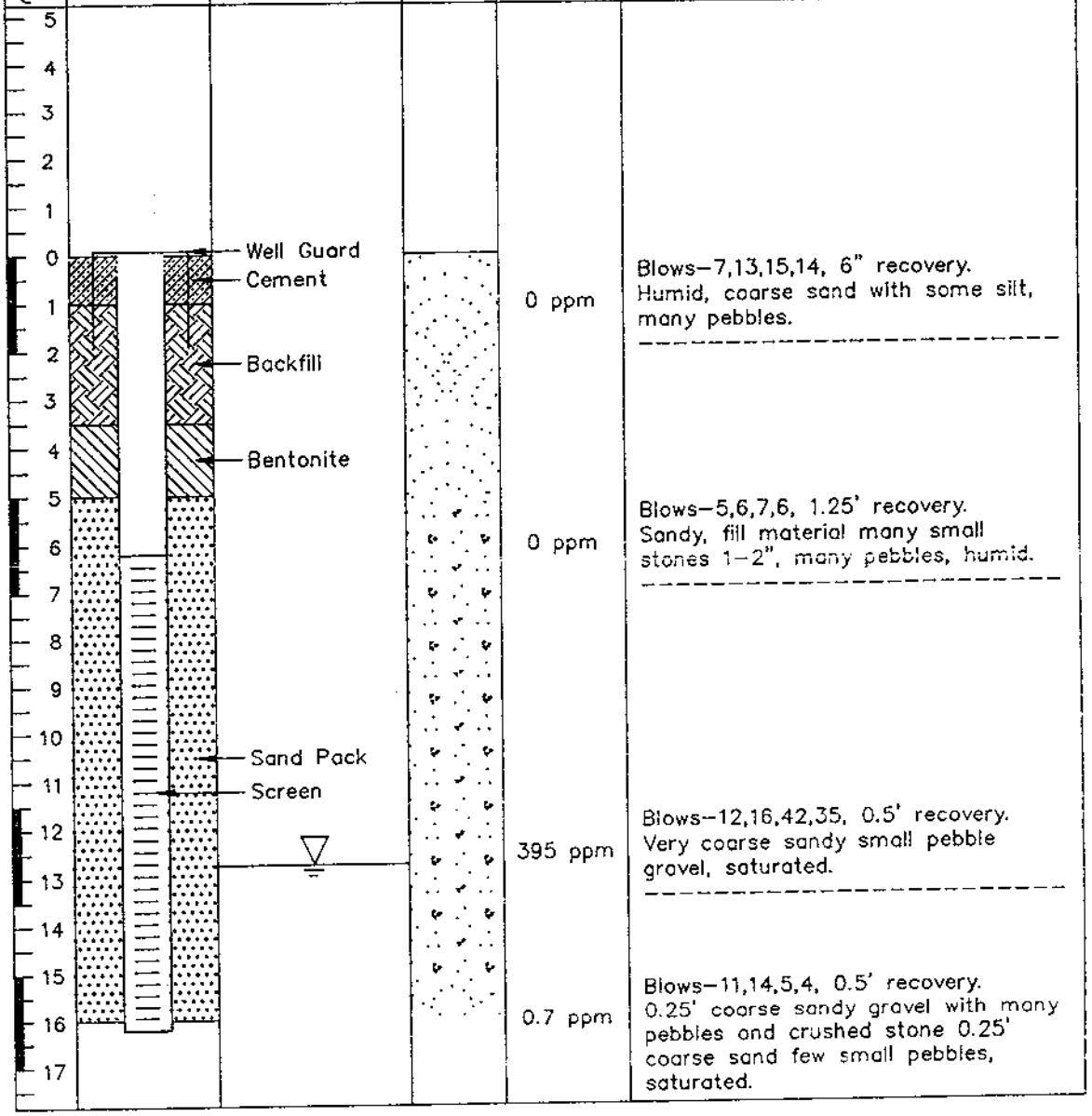
Project: Stanley Gowet
Location: West Rutland, Vermont
Job # 1-0739-2
Logged By: TMJ
Date Drilled: 5/27/92
Driller: All Terrain Drilling
Drill Method: Air Rotary

Casing Type: PVC
Casing Diameter: 2.0 in.
Casing Length: 5.8 ft.
Screen Type: Factory
Screen Diameter: 2.0 in.
Screen Length: 10.0 ft.
Slot Size: 010

Total Pipe: 15.8 ft.
Stick Up: -0.4 ft.
Total Hole Depth: 16.2 ft.
Well Guard Length: 2.0 ft.
Initial Water Level: 12.7 ft.
Surface Elevation: -
T.O.C. Elevation: -

▌ = Sampled Interval

Sheet 1 of 1



ATD

ALL TERRAIN DRILLING

PROJECT:	CLIENT:	JOB NO:	SHEET 1 OF 1	BORING NO:
SPORTSWEST	The Johnson Company	5092047		MW-4
LOCATION:	**ANGLE FROM VERTICAL:**	**BEGUN:**	**COMPLETED:**	**ELEVATION:**
Rutland, VT	0	5/26/92	5/26/92	
DRILLER:	**DRILL MAKE & MODEL:**	**OVERBURDEN:**	**ROCK (FT):**	**TOTAL DEPTH:**
S. Stimpson	Mobile B-47 Truck Rig	19 ft.	0 ft.	19 ft.
CASING SIZE/ROD SIZE:	**SAMPLER(S) TYPE:**	**SOIL CLASSIFIED BY:**		**STATION/OFFSET:**
HW / AW,NW	2" Split Spoon	Driller - Visually		
SAMPLE HAMMER WEIGHT/FALL:	**CASING HAMMER WEIGHT/FALL:**			**WEATHER:**
140 / 30"	300 / 16"			Clear

DEPTH	CASING BLOWS PER FT.	SAMPLE NO.	SAMPLE SIZE	SAMPLE FROM	DEPTH TO	SAMPLE BLOWS	VANE SIZE	VANE READINGS	DEPTH OF STRATUM CHANGE	STRATUM DESCRIPTION
H	Auger 0-5'	1D	2" s/s	0'	2'	3/4/5/5				Fill BrSifi-medSafi-coGrav
5'	Spun	2D	2" s/s	5'	7'	4/5/6/5				Brsifi-co+Grav
	Casing 5'-18.3'									
10'		3D	2" s/s	10'	11.9'	8/10/13/50-.4				BrSifi-medSaFiCoGrav
									11.9' - 13.3'	Cobble
									13.8' - 14.5'	Cobble
15'		4D	2" s/s	15	17	10/9/11/64				
										BrSaSi w/Fi-coGrav
	Washed Ahead								16' - 17'	Cobble
20'	18.3'-19'		Bottom of Boring @ 19'						19'	Cobble
25'										
30'										
35'										

LEGEND: -DENOTES
C-2"-O.D. SHELBY TUBE
S-3"-O.D.-SHELBY TUBE
U-3-1/2" O.D. SHELBY TUBE
D-SPLIT-SPOON SAMPLE

BQ-1-5/8" CORE SIZE
NQ-2" CORE SIZE
HQ-2 1/2" CORE SIZE
AW-1-23/32" ROD SIZE

BW-2 1/2" OD CASING SIZE
NW-3" OD CASING SIZE
HW-4" OD CASING SIZE
NW-2-5/8" OD ROD SIZE

BORING NO: MW-4

Autumn Pond Park • Building 3 • Box 8 • Route 101 • Greenland, NH 03840
(603)431-8666 • FAX (603)431-5982

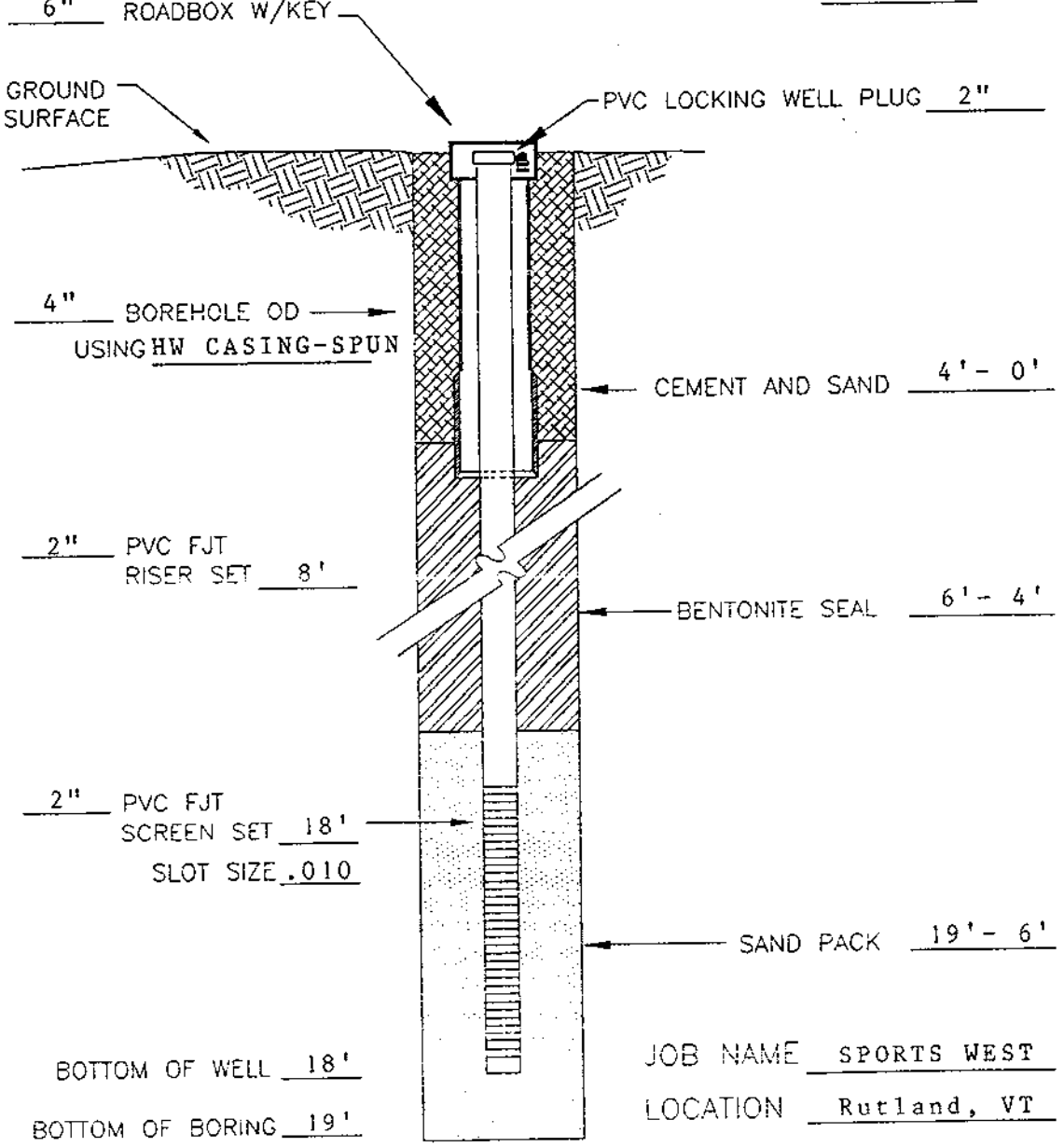
ATD

ALL TERRAIN DRILLING

MONITORING WELL CONSTRUCTION DETAILS

DATE 5/27/92

WELL NO. MW-4



JOB NAME SPORTS WEST

LOCATION Rutland, VT

Autumn Pond Park • Building 3 • Box 8 • Route 101 • Greenland, NH 03840
(603)431-8666 • FAX (603)431-5982

ATD

ALL TERRAIN DRILLING

PROJECT:	CLIENT:	JOB NO:	SHEET 1 OF 1	BORING NO:
SPORTSWEST	The Johnson Company	5092047		MW-5
LOCATION:	**ANGLE FROM VERTICAL:**	**BEGUN:**	**COMPLETED:**	**ELEVATION:**
Rutland, VT	0	5/26/92	5/26/92	
DRILLER:	**DRILL MAKE & MODEL:**	**OVERBURDEN:**	**ROCK (FT):**	**TOTAL DEPTH:**
S. Stimpson	Mobile B-47 Truck Rig	17 ft.	0 ft.	17 ft.
CASING SIZE/ROD SIZE:	**SAMPLER(S) TYPE:**	**SOIL CLASSIFIED BY:**		**STATION/OFFSET:**
HW / AW,NW	2" Split Spoon	Driller - Visually		
SAMPLE HAMMER WEIGHT/FALL:		**CASING HAMMER WEIGHT/FALL:**		**WEATHER:**
140 / 30"		300 / 16"		Clear

DEPTH	CASING BLOWS PER FT.	SAMPLE NO.	SAMPLE SIZE	SAMPLE FROM	DEPTH TO	SAMPLE BLOWS	VANE SIZE	VANE READINGS	DEPTH OF STRATUM CHANGE	STRATUM DESCRIPTION
	Auger 0-5'	1D	2" s/s	0'	2'	5/6/6/7				Fill BrFi-coSiSa+Grav
5'	Spun	2D	2" s/s	5'	7'	2/4/5/8				BrSi w/fi-coSa+Grav
	Casing 5'-15'									
10'		3D	2" s/s	10'	12'	3/2/3/1				BrSi w/fi-coSa+Grav
15'	Washed	4D	2" s/s	15	17	17/10/3/3				Weathered Rock
	Ahead 15'-17'		Bottom of Boring @ 17'							
20'										
25'										
30'										
35'										

LEGEND: -DENOTES
C-2"-O.D. SHELBY TUBE
S-3"-O.D.-SHELBY TUBE
U-3-1/2" O.D. SHELBY TUBE
D-SPLIT-SPOON SAMPLE
BQ-1-5/8" CORE SIZE
NQ-2" CORE SIZE
HQ-2 1/2" CORE SIZE
AW-1-23/32" ROD SIZE
BW-2 1/2" OD CASING SIZE
NW-3" OD CASING SIZE
HW-4" OD CASING SIZE
NW-2-5/8" OD ROD SIZE

BORING NO: MW-5

Autumn Pond Park • Building 3 • Box 8 • Route 101 • Greenland, NH 03840
(603)431-8666 • FAX (603)431-5982

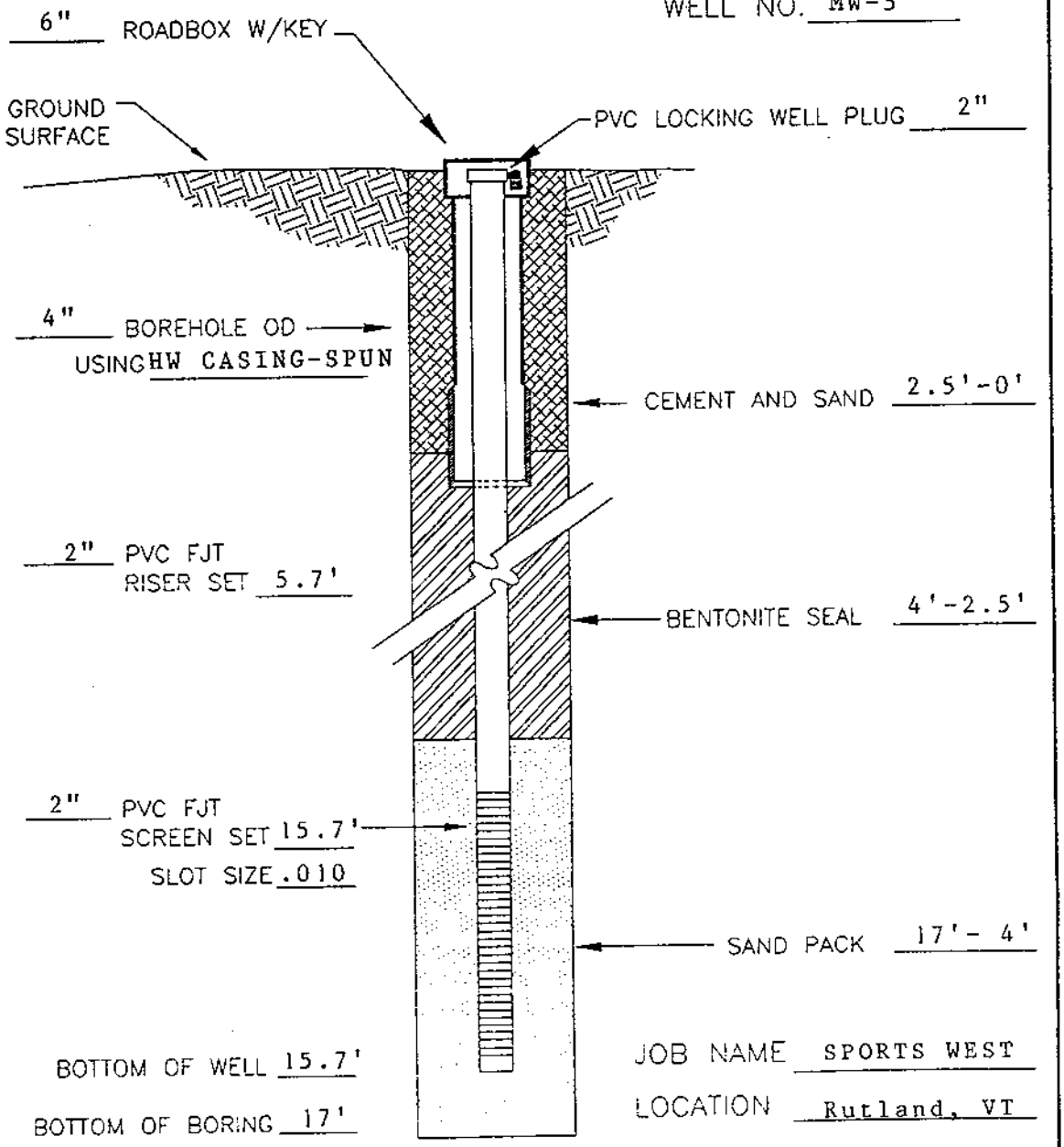
ATD

ALL TERRAIN DRILLING

MONITORING WELL CONSTRUCTION DETAILS

DATE 5/26/92

WELL NO. MW-5



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ATD

ALL TERRAIN DRILLING

PROJECT:	CLIENT:	JOB NO:	SHEET 1 OF 1	BORING NO:
SPORTSWEST	The Johnson Company	5E+06		MW-6
LOCATION:	**ANGLE FROM VERTICAL:**	**BEGUN:**	**COMPLETED:**	**ELEVATION:**
Rutland, VT	0	5/27/92	5/27/92	
DRILLER:	**DRILL MAKE & MODEL:**	**OVERBURDEN:**	**ROCK (FT):**	**TOTAL DEPTH:**
S. Stimpson	Mobile B-47 Truck Rig	18 ft.	0 ft.	18 ft.
CASING SIZE/ROD SIZE:	**SAMPLER(S) TYPE:**	**SOIL CLASSIFIED BY:**		**STATION/OFFSET:**
HW / AW,NW	Split Spoon	Driller - Visually		
SAMPLE HAMMER WEIGHT/FALL:	**CASING HAMMER WEIGHT/FALL:**			**WEATHER:**
140 / 30"	300 / 16"			

DEPTH	CASING BLOWS PER FT.	SAMPLE NO.	SAMPLE SIZE	SAMPLE FROM	DEPTH TO	SAMPLE BLOWS	VANE SIZE	VANE READINGS	DEPTH OF STRATUM CHANGE	STRATUM DESCRIPTION
										Fill
	Auger 0-5'	1D	2" s/s	0'	2'	7/13/15/14				BrSiFiCoSa+Grav
5'	Spun	2D	2" s/s	5'	7'	5/6/7/6				
	Casing 5'-10'									BrFiCoSaGravSi
									9.7'-11.2'	Cobble
		1R	NQ (2")	10.3'	11.2'	NX Core				Cored 9'
10'	Spun	3D	2" s/s	11.5'	13.5'	12/16/42/35				BrFiCoSaGravSi
	Casing 11.2'-14'								11.7' - 12.8	Cobble
									13.5' - 14.4	Cobble
		2R	NQ (2")	14'	14.4'	NX Core				Cored 4'
15'	Washed	4D	2" s/s	15	17	11/14/5/4				
	Ahead 14.4'-18'									CoGrav w/FiCoSiSa
			Bottom of Boring @ 18'							
20'										
25'										
30'										
35'										

LEGEND: -DENOTES
C-2"-O.D. SHELBY TUBE
S-3"-O.D.-SHELBY TUBE
U-3-1/2" O.D. SHELBY TUBE
D-SPLIT-SPOON SAMPLE

BQ-1-5/8" CORE SIZE
NQ-2" CORE SIZE
HQ-2 1/2" CORE SIZE
AW-1-23/32" ROD SIZE

BW-2 1/2" OD CASING SIZE
NW-3" OD CASING SIZE
HW-4" OD CASING SIZE
NW-2-5/8" OD ROD SIZE

BORING NO: MW-6

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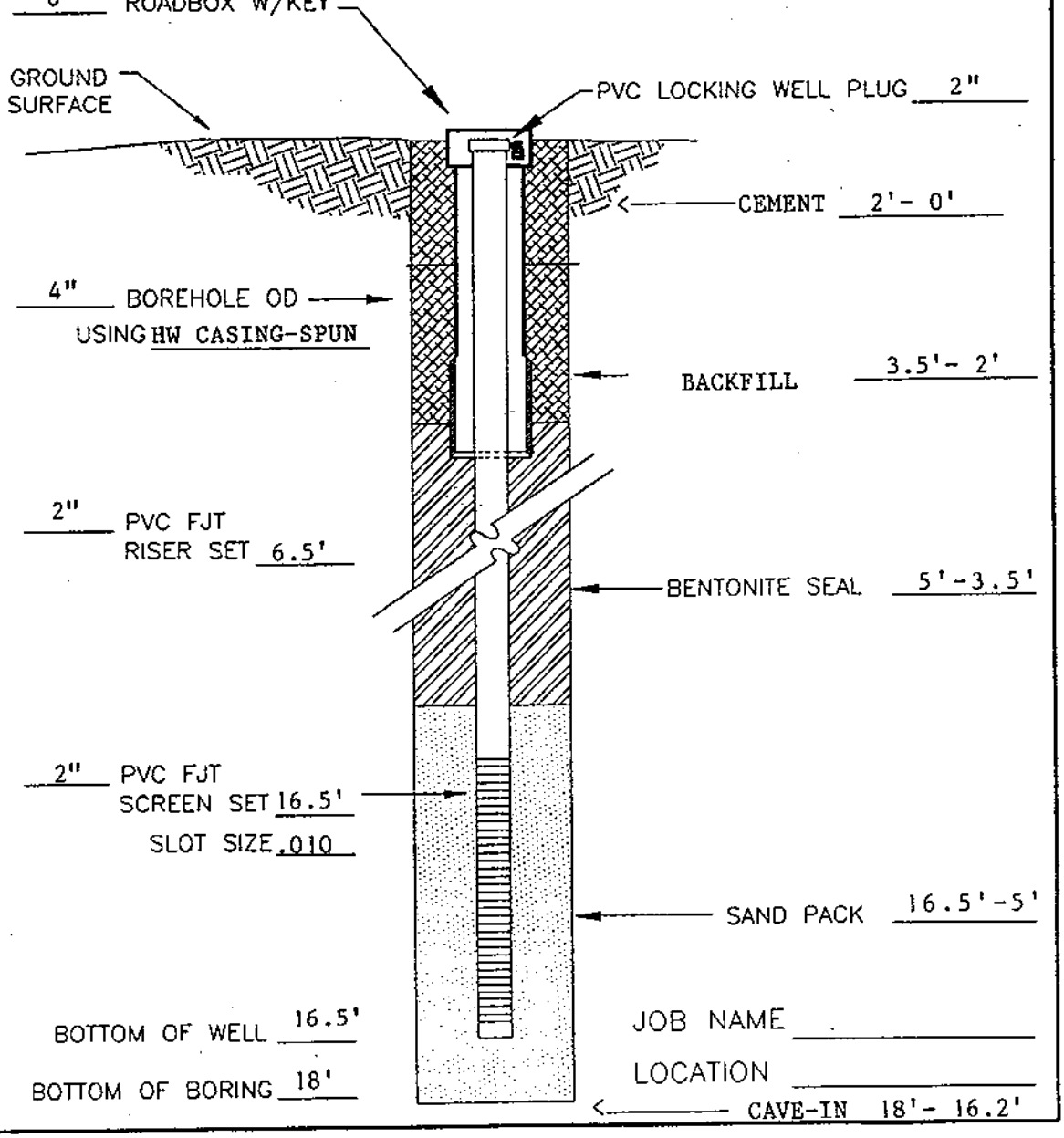
ATD

ALL TERRAIN DRILLING

MONITORING WELL CONSTRUCTION DETAILS

DATE 5/27/92

WELL NO. MW-6



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Appendix 2

Groundwater Gradient Calculations

THE JOHNSON CO., INC.
5 State Street
MONTPELIER, VERMONT 05602
(802) 229-4600

JOB Gawet 1-0739-2 (47)
SHEET NO. 1 OF
CALCULATED BY ARL DATE 7/16/92
CHECKED BY DATE
SCALE

Table 1. Relative Groundwater Elevations

Location	Toc (Reel)	(6-3-92) Depth to Gw	(6-3-92) Rel. GW Elev
MW-1	96.10'	10.57'	85.53'
MW-2	94.43'	9.68'	84.75'
MW-3	95.11'	11.02'	84.09'
MW-4	96.21'	12.38'	83.83'
MW-5	94.86'	10.43'	84.43'
MW-6	96.34'	12.34'	84.00'

THE JOHNSON CO., INC.
5 State Street
MONTPELIER, VERMONT 05602
(802) 229-4600

JOB

SHEET NO. 2 OF

CALCULATED BY ARL DATE 7-16-92

CHECKED BY DATE

SCALE

MW-1 → MW-2 $\Delta y = 85.53 - 84.75' = 0.78'$

$\Delta x = 100'$

$i = 0.0078 ft/ft$

→ dist MW-1 → 85.50'

$\Delta y = 0.03'$ $0.0078 \frac{ft}{ft} = \frac{\Delta y}{\Delta x} = \frac{0.03}{\Delta x}$

$\Delta x = \frac{0.03}{0.0078} = 3.8'$

→ dist. MW-1 → 85.00 $\Delta y = 0.53'$

$\Delta x = \frac{0.53'}{0.0078'} = 68'$

MW-1 → MW-5 $\Delta y = 85.53' - 84.43' = 1.10'$

$\Delta x = 143'$

$i = \frac{1.10'}{143'} = 0.0077 ft/ft$

→ dist. MW-1 → 85.00

$\Delta x = \frac{0.53}{0.0077} = 68.8' \rightarrow 69'$

→ Dist MW-1 → 84.50

$\frac{\Delta x = 1.03}{i = 0.0077} = 133.8' \rightarrow 134'$

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5 State Street
MONTPELIER, VERMONT 05602
(802) 229-4600

JOB Sportswest 1-0739-2
SHEET NO. 3 OF
CALCULATED BY ARL DATE 7-16-92
CHECKED BY DATE
SCALE

MW-1 → MW-3

$\Delta y = 85.53' - 84.09' = 1.44'$

$\Delta x = 173'$

$i = \frac{1.44'}{173'} = 0.0083$ ft/ft

dist MW-1 → 85.00

$\Delta y = 0.53'$ $\Delta x = \frac{0.53'}{0.0083} = 64'$

MW-1 → 84.50

$\Delta y = 1.03'$

$\Delta x = \frac{1.03}{0.0083} = 124'$

MW-1 → MW-6 $\Delta y = 85.53' - 8400 = 1.53'$

$\Delta x = 176'$

$i = \frac{1.53'}{176'} = 0.0087$ ft/ft

MW-1 → 85.00

$\Delta x = \frac{0.53}{0.0087 \text{ ft/ft}} = 60.9'$

MW-1 → 84.50

$\Delta x = \frac{1.03}{0.0087} = 118.4'$

THE JOHNSON CO., INC.
5 State Street
MONTPELIER, VERMONT 05602
(802) 229-4600

JOB Southwest - 1-0739-2
SHEET NO. 4 OF
CALCULATED BY ARL DATE 7-16-92
CHECKED BY DATE
SCALE

MW-1 → MW-4 $\Delta y = 85.53 - 83.83 = 1.70'$

$\Delta x = 201'$

$i = \frac{1.70}{201} = 0.0085 ft/ft$

Dist MW-1 → 85.50

$\Delta x = \frac{0.03}{0.0085} = 3.5'$

Dist MW-1 → 85.00

$\Delta x = \frac{0.53}{0.0085} = 62.4'$

Dist MW-1 → ~~85~~ 84.50'

$\Delta x = \frac{1.03}{0.0085} = 121'$

Dist MW-1 → 84.00

$\Delta x = \frac{1.53}{0.0085} = 180'$

Appendix 3

Water Quality Data/Chain of Custody forms

LABORATORY REPORT

CLIENT NAME:	The JOHNSON CO.	LABORATORY NO.:	2-0861
ADDRESS:	5 State Street Montpelier, VT 05602	PROJECT NO.:	78611
		DATE OF SAMPLE:	6/3/92
SAMPLE LOCATION:	Stanley Gawet West Rutland	DATE OF RECEIPT:	6/3/92
		DATE OF ANALYSIS:	6/5-9/92
ATTENTION:	Tammy Jacques	DATE OF REPORT:	6/26/92

RESULTS
(ug/l micrograms per liter)

PARAMETER	WS Well	SW-2	Rep MW-4	Rep % RD	Trip Blank
Benzene	<1	4	694	10.0	<1
Toluene	<1	8	2191	2.2	<1
Ethylbenzene	<1	<1	305	3.8	<1
Total Xylenes	<1	3	1325	3.4	<1
Chlorobenzene	<1	<1	<50	---	<1
1,2-Dichlorobenzene	<1	<1	<50	---	<1
1,3-Dichlorobenzene	<1	<1	<50	---	<1
1,4-Dichlorobenzene	<1	<1	<50	---	<1
Methyl Tertiary Butyl Ether	<1	7	266	33.3	<1
Surrogate % Recovery 8020	97%	94%	86%	---	82%

Detection level 1 ug/l, except as noted.
EPA Method 8020.

SCITEST

SCITEST
LABORATORY SERVICES
P.O. Box 339
Randolph, Vermont 05060-0339
(802) 728-6313

LABORATORY REPORT

CLIENT NAME:	The JOHNSON CO.	LABORATORY NO.:	2-0561
ADDRESS:	5 State Street Montpelier, VT 05602	PROJECT NO.:	7561
		DATE OF SAMPLE:	6/3/92
SAMPLE LOCATION:	Stanley Gawet West Rutland, VT	DATE OF RECEIPT:	6/3/92
		DATE OF ANALYSIS:	6/5-9/92
ATTENTION:	Tammy Jacques	DATE OF REPORT:	6/26/92

RESULTS
(ug/l micrograms per liter)

PARAMETER	MW-1	MW-2	MW-4	MW-5	MW-6
Benzene	<1	6	2280	<1	7700
Toluene	<1	2	322	<1	730
Ethylbenzene	<1	<1	1390	<1	4530
Total Xylenes	<1	<1	<100	<1	<500
BTEX	<1	<1	<100	<1	<500
Chlorobenzene	<1	<1	<100	<1	<500
1,2-Dichlorobenzene	<1	<1	<100	<1	<500
1,3-Dichlorobenzene	<1	<1	<100	<1	<500
1,4-Dichlorobenzene	<1	6	430	189	6320
Methyl Tertiary Butyl Ether	89%	93%	85%	96%	90%
Surrogate % Recovery 8020					

Detection level 1 ug/l, except as noted.
EPA Method 8020

Respectfully submitted,

SCITEST, INC.

Roderick J. Lamothe
Laboratory Director

RJL/ps

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CHAIN OF CUSTODY RECORD

Client/Project Name	Project Location
Stanley Mart	West Rutland VT
Project No.	**Field Logbook No.**
1-0130	
Sampler: (Signature)	**Chain of Custody Tape No.**
[signature]	

Sample No./ Identification	Date	Time	Lab Sample Number	Type of Sample	EPA 8020	REMARKS
MW-1	6-3-92	13	2-0861	water	X	
MW-2	6-3-92	12		water	X	
MW-3	6-3-92	11		water	X	
MW-4	6-3-92	14		water	X	
MW-5	6-3-92	10		water	X	
MW-6	6-3-92	15		water	X	
WS Well SW-1	6-3-92			water	X	
Trip Blank	6-3-92	8:45		water	X	

	Date	Time		Date	Time
Relinquished by: (Signature) [signature]	6-3-92	420	Received by: (Signature)		
Relinquished by: (Signature)			Received by: (Signature)		
Relinquished by: (Signature)			Received for Laboratory: (Signature) James P Marr	6/3/92	4:20
Sample Disposal Method:			Disposed of by: (Signature)		

SAMPLE COLLECTOR

5 State Street
Montpelier, VT 05602
(802) 229-4600
Fax: (802) 229-5876

THE JOHNSON COMPANY, INC.
Environmental Sciences and Engineering

ANALYTICAL LABORATORY

SC. test

1974-3-84

WHITE - To accompany sample to the lab and returned to the Johnson Co. YELLOW - Lab copy PINK - Transporter copy GREEN - Sampler copy